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ABSTRACT

The handbook focuses on the accessibility of facilities to handicapped individuals. General information on accessibility requirements mandated by law is provided. Information on state and local legislation on architectural barriers gives suggestions for where to write to find out what laws apply where. Definitions of terms such as accessible, barrier free, and usable are given; as well as a listing of conditions that create the need for an accessible environment. Minimum accessibility requirements for buildings are identified and federal funding for removal of barriers is discussed. Addresses of organizations with local chapters that may be able to assist in planning alternative ways of achieving accessibility are provided. The elements of an accessible system, including modifications in existing facilities, are listed as follows: parking, curb cuts, walkways, ramps, entrances, doors, floors, corridors, elevators, stairs, toilet rooms, and convenience and support facilities (such as drinking fountains and alarm signals). A short list of recommended resources is included. Addresses of information resources and sources for the international symbol of access are appended. (PHR)

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# Opening Doors

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A Handbook on Making Facilities
Accessible to Handicapped People

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March 1978

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A publication of

National Center for a Barrier Free Environment
Seventh and Florida NE, Washington, D.C. 20002

Prepared for

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# Foreword

Of the estimated 36 million Americans who have handicapping conditions, the vast majority are capable of enjoying independent, productive lives. It is not their disabilities that prevent their exercise of the right to participate in community life; the handicapping factor is, rather, the design of the environment in which they must function.

The commitment of our public authorities, from the Federal government to many municipal councils, has been made: handicapped citizens have equal rights with their able-bodied counterparts to have access to employment, programs and services. In most cases, providing that access means making alterations to the buildings and facilities in which the activities are conducted. It is the purpose of this handbook to suggest some approaches to opening the doors to people with handicaps.

For Community Services Administration grantees, the importance of making facilities accessible to the disabled individual is underscored by two facts: the high incidence of disability among aged people, who make up a significant portion of CSA clients; and the high proportion of handicapped people in lower income groups. For example, it was reported in 1965 by the National Center for Health Statistics that among persons 45 years and older, the rate of paralysis is about three times as high among those with incomes of $3,000 or less as among those having incomes of $10,000 or more. To fulfill the objective of improving the lives of disadvantaged members of society clearly requires a special effort to make the built environment fully accessible so that disabled people can move into the mainstream of community life.

In the sections which follow, general information about accessibility requirements is presented as an introduction to the subject. This information is not based on a particular government regulation, standard or policy, but rather is a synthesis of frequently referenced material. Specific references to published standards and design criteria are provided for further research.

# The Law of the Land

In 1968, the United States Congress passed the Federal Architectural Barriers Act (Public Law 90-480) "to ensure that certain public buildings, financed with Federal funds, are so designed and constructed as to be accessible to the physically handicapped." Other federal legislation has stated as national policy that all "elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services" (Urban Mass Transportation Assistance Act, Public Law 91-453). The Education for All Handicapped Children Act (Public Law 94-142) was enacted to ensure access to public education. A number of other federal statutes also address the rights of handicapped Americans to enjoy public institutions and services.

The section of federal law that may have the most impact, however, was passed quietly without even a Congressional hearing. Although it has since had widespread public attention, and despite the fact that the law was passed in 1973, it is only now beginning to have an effect. That law is Section 504 of the Rehabilitation Act of 1973. It states that "No otherwise qualified handicapped individual in the United States....shall, solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

The Department of Health, Education and Welfare, designated as the lead agency for implementing Section 504, issued its final regulation effective June 3, 1977. HEW regulations require, among other things,

program accessibility of all recipients of HEW funds, with a three-year period for making any structural alterations that are necessary to achieve program accessibility. All new construction undertaken by recipients must be designed for complete accessibility to physically handicapped people - the concept known as "barrier free." At this writing, other federal departments are preparing regulations for implementing Section 504 wherever their funds are used. When fully enforced, Section 504 can have revolutionary effect on the shape of the environment in which we live, work, recreate, study and relax. It will, in fact, benefit all Americans because the environment that is accessible to physically handicapped people is easier and safer to use for all.

# Grass Roots Action

While these actions by the Federal government were taking place, progress was being made on the state and local level in passing legislation against barriers, writing building code provisions for handicapped accessibility, and carrying out projects to remove barriers. All fifty states have architectural barriers laws on the books, and a number of cities have passed local codes on accessibility.

### *Standards, codes and regulations— what do they all mean?*

The standard most frequently cited in this context is the American National Standards Institute (ANSI) A117.1, "Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped." First developed in 1961 and re-issued with minor revisions in 1971, the ANSI is now in the process of being revised and expanded. As a standard, ANSI does not have the force of law. It is, rather, a recommended set of *minimum* design criteria designed to serve as the basis for codes and regulations. The purpose of the standard is to establish a uniform set of minimum requirements for the construction industry below which the detailed requirements of codes and regulations will not fall.

A standard has the force of law only when it is specifically referenced in a building code, regulation, or legislative act. Following its issuance in 1961, the ANSI standard was adopted in many of the building codes, regulations and state barriers laws. It has also been adopted by many federal agencies and is referenced in HEW's Section 504 regulations.

As the accessibility movement gathered force over the years, a number of public authorities began to add to or amend the basic ANSI specifications or develop their own criteria in response to changing standards in

level and quality of accommodations that were considered appropriate.

In addition to codes and regulations, other requirements may be established as "design criteria" for specific projects undertaken by agencies such as the General Services Administration or state construction agencies that have ownership, design and budget control over new construction.

The first step, then, in any accessibility project is to determine what building codes and regulations apply to a particular facility. If the construction is federally funded, information on applicable standards for the funding agency may be obtained from the agency or from the Architectural and Transportation Barriers Compliance Board, 330 C Street SW, Washington, D.C. 20201.

To find out what state laws may apply, contact your Governor's Committee on Employment of the Handicapped (which may be addressed care of your State Capitol), or your state building code agency. Be sure to check your local government offices for information on county or municipal codes.

In the various laws, codes and regulations that govern accessibility, a number of words and phrases - ranging from "barrier free" to "reasonable accommodation" - are frequently used. Most people working in the field agree on these common definitions of the most often repeated terms:

- Accessible is used to describe those facilities or parts of facilities which may be entered and used by individuals despite handicapping conditions. Accessibility includes responding to the needs of people with sight or hearing disabilities in addition to those with activity, manual or mobility impairments.

- Barrier free refers to the complete removal, elimination or avoidance of those elements of the built environment that constitute obstacles preventing handicapped people from enjoying the full and free use of that environment. Characteristics of the built environment that do not meet the needs of sight- or hearing-impaired individuals are included in the category of "barriers."
- Readily accessible is the concept of providing access for handicapped individuals that is substantially equivalent in terms of ease and convenience of use to that afforded the able-bodied.
- Reasonable accommodation is used in an employment context to describe the adaptation of environments, schedules or requirements to adapt to the known physical or mental limitations of a handicapped applicant or employee. Reasonable accommodation may include making facilities used by employees readily accessible to and usable by handicapped persons, as well as job restructuring, part-time or modified work schedules, acquisition or modification of equipment or devices, the provisions of readers or interpreters, and other similar actions.
- Usable describes those parts of the environment that can be used or operated by individuals with physical or sensory limitations.

In planning for accessibility, a central concern is the need for accommodating a variety of disabilities. Most standards and recommended design criteria now in circulation are based on the needs of four basic conditions: the person in a wheelchair, or on crutches, or the blind person or hearing-impaired person. A more complete listing of conditions that create the need for an accessible environment includes:

- Temporary impairments, encompassing fractures, pregnancy, and convalescence from disease, trauma, or surgery. It has also been noted that the concept of temporary handicap could be extended to cover

those engaged in carrying or moving large or heavy loads.

- Activity impairments other than mobility, visual or audial impairments. This category is generally descriptive of persons suffering diseases of the heart or lungs, neurological diseases that result in lack of coordination, or forms of arthritis or rheumatism. It also includes extremes of size and weight from dwarfism to obesity.
- Mobility impairments (semi-ambulatory) which cause difficulty in walking, climbing, bending, or otherwise curtail the mobility of an individual. Persons who use crutches, canes, walkers, braces, artificial limbs or orthopedic shoes are included in this category.
- Mobility impairments (non-ambulatory) refer to those disabilities which confine an individual to a wheelchair all or part of the time.
- Manual impairments may be either partial or total loss of manual dexterity in one or both hands.
- Visual impairments may range from color blindness to dysfunctions such as loss of sight in one eye, cataracts, ophthalmologic diseases, or total loss of vision.
- Hearing impairments include partial loss of hearing or total deafness.
- Aging as a process may have effects encompassing many of the disabling conditions identified on this list.

# Accessibility in New Facilities and Old

When designing and constructing new facilities, it is essential to begin the design process with complete awareness of the full range of needs that must be accommodated. Given this consideration at the outset, it is possible to build facilities that are completely accessible to the physically handicapped with little or no additional cost, unless it is necessary to add an elevator that would otherwise not be required for vertical circulation. The same is true when planning a renovation project. Including accessibility features in remodeling plans need not add significantly to the total project cost.

A major goal of eliminating barriers in both new and existing structures should be to provide the same access to facilities for physically handicapped users as for able-bodied; in other words, to mainstream physically handicapped people. Mainstreaming avoids accessibility solutions that signal "special accommodations"; rather, it emphasizes such things as making principal building entrances accessible and developing accessible routes of travel that lie within major traffic flow patterns for a given facility.

While new construction can be made barrier free, existing structures may have constraints of space or structural characteristics that make it necessary to plan a phased program for complete accessibility. It then becomes essential to establish priorities for steps leading to a fully accessible facility. Although the building use, number of floors, and type of construction may influence the ordering of priorities, the following items in general are considered essential for minimum accessibility:

- Access to the building, through a primary public entrance. Building access should include marked parking and other site accommodations for the handicapped user.
- Access to primary use facilities such as offices or meeting rooms. For multi-level buildings, vertical access should be provided to ensure usability of the full facility.
- Access to toilet rooms and other convenience and support facilities. One toilet stall in each restroom in the building should be made accessible, as well as one water fountain on each floor and one telephone in each bank of public telephones.

# Paying for the Project

In preparing for a renovation project to remove barriers, the first question is frequently a fundamental one: where the funds will be found to pay for the project.

Congress is currently considering appropriations to assist with costs of compliance with Section 504 of the Rehabilitation Act of 1973, with some bills limited to educational institutions. While Congressional deliberations go on, there are in existence a number of Federal funding programs that may be tapped for architectural barrier removal. As with any fund-raising effort, the key is to tailor the proposal to the specifications of the particular program.

Comprehensive Employment and Training Act (CETA) funds, for example, have been used in some communities to hire survey teams to identify architectural barriers. In other areas, CETA has paid for drivers for transportation services for handicapped people. Alterations projects might be carried out by workers under the CETA program as well. For more information on CETA, contact your local prime sponsor or Regional Administrative Officer, Department of Labor Employment and Training Administration, or Administrator of Employment and Training, Department of Labor, Room 6000, Patrick Henry Building, 601 D Street NW, Washington, D.C. 20210.

Community Development Block Grants are another potential source of funds. HUD has recently issued new regulations for this program authorizing use of block grant monies to remove architectural barriers in privately-owned facilities, which opens up potential application of this program to facilities leased from private landlords. For more information, including copies of the proposed regulation, contact your HUD area office or the

Assistant Secretary for Community Planning and Development, Department of Housing and Urban Development, Washington, D.C. 20410.

There are other Federal programs, including the Treasury Department's general revenue sharing, that could be potential sources of funds. The Architectural and Transportation Barriers Compliance Board, 330 C Street SW, Washington, D.C. 20201, has compiled a "Funding Guide for the Removal of Environmental Barriers" that lists these programs. The guide is available at no charge on request to the Compliance Board.

Private landlords may be encouraged to make facility modifications if they are made aware of the federal income tax deduction for barrier removal. Up to $25,000 in costs incurred in removal of barriers may be deducted each taxable year through December 31, 1979. Further information about the tax provision may be obtained from the Legislation and Regulations Division, Office of the Chief Counsel, Internal Revenue Service, 1111 Constitution Avenue NW, Washington, D.C. 20224.

Locally-based private foundations and civic and voluntary service organizations are also possible sources of funds for renovation or special equipment. Materials might be donated by local dealers in building supplies, lumber or hardware.

# Some Strategies for Success

*Seeking advice from the experts— the handicapped consumers*

Where funds for making modifications are limited, the decision must be made as to how the available funds can be used most effectively. An excellent source of counsel will be the disabled user.

HEW regulations for Section 504 require that handicapped people be consulted in developing accessibility plans. One useful approach is to include handicapped people on the planning team. These individuals should be selected on the basis of their knowledge of environmental barriers and should represent a variety of disabilities, including hearing and sight impairments as well as orthopedic handicaps and other disabling conditions.

In addition to advising on establishing priorities, knowledgeable handicapped consumers can frequently be a source of assistance in planning renovations and developing alternative ways of achieving accessibility. Once the project is underway, a consumer panel will be particularly useful to monitor the work and ensure that alterations are being carried out as planned. Finally, they will be able to test the finished project to ensure its usability.

Handicapped clients and employees are likely candidates for a consumer panel. Local organizations of handicapped people, or local organizations serving handicapped people, are also recommended as a source of knowledgeable assistance. A number of national consumer organizations have local chapters that may be able to provide assistance. Among them are:

American Coalition of Citizens with Disabilities
1346 Connecticut Avenue NW, Room 817
Washington, D.C. 20036
(chapters in states)

American Council of the Blind
1211 Connecticut Avenue NW, Suite 506
Washington, D.C. 20036
(state and local chapters)

Disabled American Veterans
3725 Alexandria Pike
Cold Spring, Kentucky 41076
(state and local units)

National Association of the Deaf
814 Thayer Avenue
Silver Spring, Maryland 20910
(local chapters)

National Association of the Physically Handicapped
76 Elm Street
London, Ohio 43140
(local chapters)

National Congress of Organizations of the Physically Handicapped
6106 N. 30th Street
Arlington, Virginia 22207
(state councils composed of organizations of handicapped people)

National Paraplegia Foundation
333 N. Michigan Avenue
Chicago, Illinois 60601
(state and local chapters)

Paralyzed Veterans of America
4330 East West Highway, Suite 300
Washington, D.C. 20014
(state and area chapters)

Additional assistance may come from your state Governor's Committee on Employment of the Handicapped or your state Department of Rehabilitation, as well as from local affiliates of national voluntary health organizations such as the National Easter Seal Society or United Cerebral Palsy, and from chapters of professional organizations such as the National Rehabilitation Association.

### *Team up for Greater Impact*

Making a building accessible is only part of opening up a facility to use by physically handicapped people. The total environment, including parking, curb cuts, and walkways, must be free of barriers. In some

situations, one or more of these may be areas of municipal responsibility.

Teaming up with local organizations of handicapped people, parents of handicapped children, voluntary groups serving the handicapped population, and senior citizens groups - whose members experience a high incidence of disabilities - can be an effective means of persuading your city or county government that access is important. Find out when your city is holding the required public hearings on community development plans to be funded under the Community Development Block Grant program, and get the need for funds for accessibility on the public record.

Of course, many local governments are already conducting active programs to make their communities accessible; others may be ready to launch such a program if approached by concerned citizens. In either case, the team contact can help secure assistance where it is needed.

*Don't be intimidated by design criteria for accessibility*

There are frequently alternative ways to make buildings accessible that are less expensive than traditional approaches but work equally well. For example, the usual response to steps at an entrance is to build a ramp. However, for entrances with only two or three steps, it is often less expensive to relandscape the approach area, creating a gentle slope to the entrance level, rather than construct a ramp. The resulting entrance provides the same easy access for all building users and reduces maintenance problems, particularly for snow and ice removal.

For changes in level of less than a full story, wheelchair lifts can be an economical answer. Not all building codes permit the installation of lifts in publicly-used buildings, however; it will be necessary to consult your local code - and maybe work to have it changed. Wheelchair

lifts are functioning successfully in both indoor and outdoor locations in a number of buildings around the country.

A disabled consumer panel may be able to suggest other alternative approaches to other accessibility problems.

# Elements of an Accessible System

Facility accessibility should be viewed as a system - a continuous accessible route of travel from parking and walkways into and through the building. The following items indicate some major components of the accessible route of travel and suggest some modifications to existing facilities that will help to create such a route. This listing should not be considered comprehensive, nor should it be used as a standard. Rather, it is a compilation of frequently recommended accessibility features. For detailed design criteria, refer to the publications listed under Design Resources (page 28). The suggestions for modifications to existing facilities are presented to point out some possible solutions for common problems.

An accessible route of travel would include:

## Parking

Parking spaces should be reserved for handicapped people as close as possible to accessible building entrances. The spaces must provide a 4-foot-wide level area adjacent to the parking place to allow individuals in wheelchairs or on braces or crutches to get in or out of the vehicle onto a level surface. This access aisle must be clearly marked to prevent having it blocked by small vehicles. There must be an accessible path, with curb cuts at appropriate points and without stairs or abrupt grade changes, from the parking space to the accessible entrance (see Figure 1).

- In existing parking lots, two regular parking spaces may be combined for one handicapped space, or three adjoining spaces may be used for two handicapped spaces with a common access aisle.

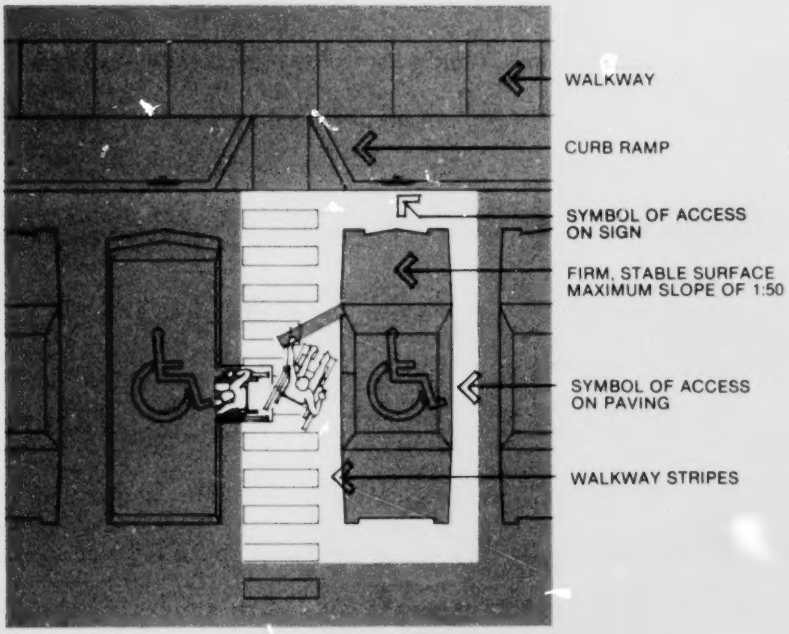



Figure 1

# Curb Cuts

Any curbs in the route of travel should have curb cuts (or curb ramps). They should be marked or otherwise protected to prevent obstruction by parked vehicles, loading zones, or street furniture. Recessed ramps (curb cuts) are recommended rather than ramps that project into the roadway and may interfere with traffic or drainage.

# Walkways

All walks should be level and provide a firm, stable, non-slip surface for walking or wheeling. Snow and ice removal is essential to assure usability at all times. Joints or gratings in walkways should have openings no larger than 1/2 inch in order to avoid trapping wheelchair tires or crutch and walker tips.

Where walkways or routes of travel intersect other paths of travel, or pass through an island, the surface should blend to a common level.

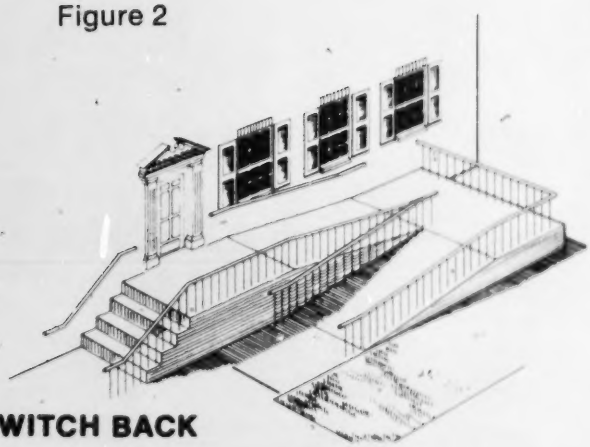
- On existing walks with steep slopes, handrails should be added on one or both sides. These handrails should project beyond the ends of the slope.
- Posts, benches, or trash containers should be removed from walkways if they obstruct the route of travel.

# Ramps

The longer the ramp, the less steep the slope should be. Slope of a ramp should not exceed 1:12. Handrails on at least one side are recommended for all ramps, with handrails on both sides preferred. Where a ramp leads to an entrance door, there must be a level landing large enough to allow a person in a wheelchair sufficient maneuvering space to open the door without rolling back onto the slope. Long ramps should have level rest areas at intervals not more than 30 feet.

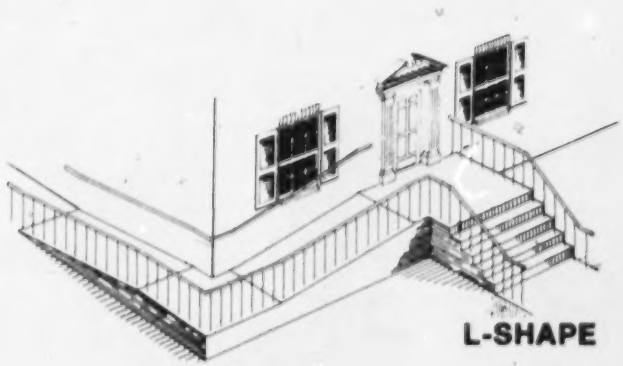
When space limitations or existing landscaping rule out a straight-run ramp, switch-back or L-shape ramps may be installed. Level rest areas must be provided at each turn (see Figures 2 and 3).

Figure 2



SWITCH BACK

Figure 3



L-SHAPE

# Entrances

At least one principal entrance to a building must be accessible. This entrance must connect with the accessible route of travel, not blocked by steps or escalators, that leads to all accessible space in the building.

- It is sometimes possible to regrade the approach area and bring the ground level to the level of the entrance, at a cost less than that of constructing a ramp.

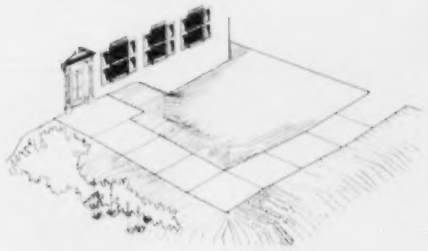


Figure 4

- Wheelchair lifts may be an option for entrances that cannot be ramped easily, but adequate safety precautions must be taken.
- If there is no existing entrance that can be ramped, look for the location where the ground level is closest to the floor level. An existing window might be converted to an entrance, or a new door cut.

# Doors

All doorways should have a minimum clear width of 32 inches when open. If there are double doors, each single leaf must provide 32 inches clear width. Doors should be easy to operate with one hand; lever handles or push-type operating mechanisms are recommended for manually-operated doors. Power doors are especially convenient at entrances. Revolving doors and turnstiles should never be the sole means of entry to a facility or any of its areas.

Exterior door closers should not require more than 8-1/2 lbs. pressure to open; interior door closers should be operable with 5 lbs. of pressure or less.

The approach to an outswinging door should provide enough clear space

(24 inches) on the latch side of the door to allow a person in a wheelchair to pull up beside the door and swing it open without backing up (Figure 5).

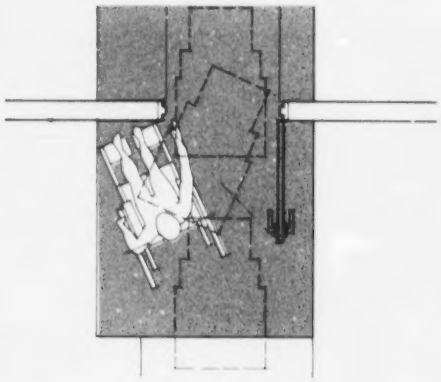


Figure 5

- Doorways can sometimes be widened sufficiently to permit access by removing the stop or altering the door jamb, or by installing offset (hospital-type) hinges.
- Door closer pressure can be adjusted to permit operation by a disabled individual, or the closer can be replaced by a light-pressure one or removed entirely.
- Where there is no door closer, adding an auxiliary handle on the inside of the door can assist disabled people to pull the door closed after they have passed through the opening.

# Floors

Floors should be level throughout and have a surface that is smooth, firm and slip-resistant. Thick carpets and mats should be avoided, and all carpets and mats should be securely fastened down. If floors are carpeted, a firm, hard-surfaced carpet with dense pile is recommended.

Where there are level changes on a given floor, the level change should be ramped or a wheelchair lift installed.

It is recommended that thresholds be no higher than 1/2 inch, and all thresholds should have beveled (sloping) edges.

- Thresholds should be removed wherever possible to provide a continuous level floor surface. Thresholds having an abrupt edge (such as frequently found in toilet rooms with ceramic tile floors) should be replaced with sloped thresholds or have a sloping surface added if they cannot be removed, as shown in Figure 6.

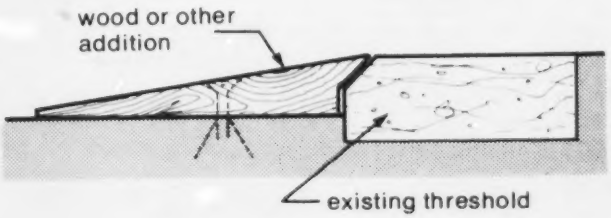



Figure 6

# Corridors

Corridors and hallways should be at least 36 inches wide. A width of 60 inches is needed to allow a wheelchair to turn around, or to permit two wheelchairs to pass.

Wall-or-ceiling-hung objects projecting lower than 80 inches into the corridor space should be removed so that they will not present a hazard to people with visual impairments.

- Narrow hallways that cannot be widened can be improved by removing any obstructions such as drinking fountains or trash receptacles.

# Elevators

Elevators should be provided for access between floors. Elevator controls and emergency call equipment should be placed so that the highest operating point can be reached from a wheelchair (48 inches from the floor).

Both visible and audible signals for elevator arrival and direction should be provided. Tactile markings using standard alphabet and arabic numerals should be placed adjacent to call buttons and floor buttons. Braille markings may be used in addition to, but should not replace, standard tactile lettering. Tactile floor designations should be affixed on either door jamb at each floor. Elevators cars should have handrails on three sides at a height of 32 inches from the floor.

- If controls cannot be lowered in existing elevators, an additional set of controls at a lower level might be added.
- Tactile markings can be applied to existing elevator control panels.
- In an existing building, elevator shafts can sometimes be constructed outside and abutting an exterior wall of the building, or can be free-standing and connected to the building by bridges. These options may be less expensive than adding an interior elevator shaft and will not disrupt use of the building during construction.

# Stairs

Stairs should have uniform riser heights and tread widths, with closed risers and gently sloped tread nosings to reduce tripping hazards for people using crutches or other walking aids. Handrails of a size and shape to be easily grasped should be provided on both sides of stairways, with extensions at both top and bottom of stairs.

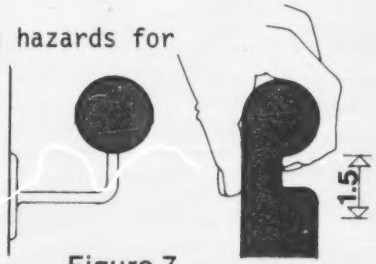



Figure 7

- Square nosings on existing stairs can be modified by adding fillers that are securely anchored to the face of the riser.

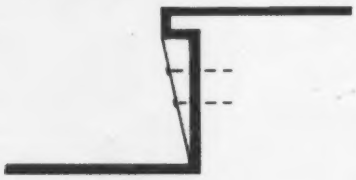


Figure 8

27

# Toilet Rooms

Toilet rooms should have an accessible path of travel from the entrance door to at least one accessible stall. Where there are privacy screens, sufficient clearance (42 inches) should be provided to allow wheelchair turning space. A 60-inch-square clear floor area is needed inside the toilet room to permit a wheelchair user to turn around and exit facing forward.

Mirrors, dispensers, operating mechanisms and similar equipment should be installed with lower edges no higher than 40 inches from the floor. At least one lavatory must allow for wheelchair clearance beneath the apron. Lever handles are recommended for water faucets.

Where water temperature may exceed 110°, water supply and waste pipes should be insulated or covered to prevent contact with wheelchair users. Insensitivity to heat resulting from functional loss in the legs could allow an individual to be burned without realizing it.

Toilet stalls should have outswinging doors with a minimum clearance of 32 inches, and should provide sufficient width and depth to allow a wheelchair to enter and maneuver for transfer to the toilet. Space should allow for side as well as front transfer. Wall-hung grab bars should be provided on the wall adjacent to the toilet and behind the toilet where side approach is provided and on both sides of toilet where frontal approach is provided. Existing stalls can be altered as shown in Figure 9 to provide access.

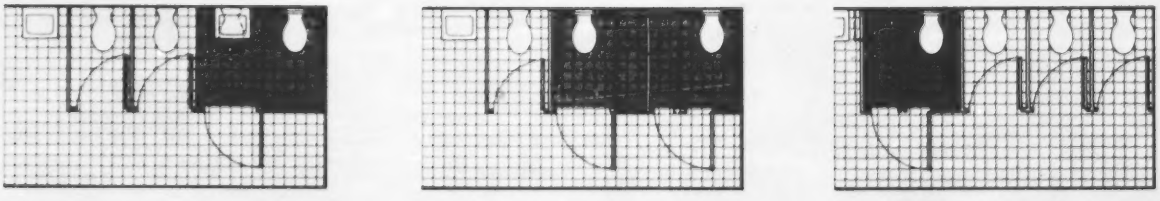


Figure 9

Single toilet rooms should have a 60-inch square clear floor area to allow wheelchair maneuvering within the room (see Figure 10).

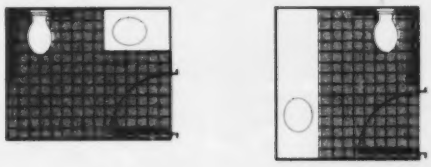


Figure 10

# Convenience and Support Facilities

Drinking fountains should be low enough to be used by people in wheelchairs, and should not be recessed into an alcove unless the alcove is wide enough and deep enough to accommodate a wheelchair. To avoid creating a hazard to the blind, drinking fountains should not project into corridors.

- If drinking fountains are too high, an additional one could be installed at a lower height (30 inches recommended) or a paper cup dispenser could be installed with dispensing point no higher than 40 inches.

Public telephones should have at least one of any bank of phones mounted so that dial and handset are reachable from a wheelchair. At least one phone should be equipped with volume control for those with hearing disabilities.

Operating switches and controls (light switches, drinking fountains, dispensing machines, etc.) should be operable by people with limited manual dexterity and strength, and should be located within easy upward reach of a person in a wheelchair.

- If controls are too high to be reached easily from a wheelchair

but cannot be moved, providing clear floor and wall space so that a wheelchair can make a close approach to the control may make it possible for most wheelchair users to operate the control.

Fire alarms and emergency devices should be mounted at a height that is within easy upward reach from a wheelchair.

Alarm signals should be both audible and visible (such as flashing lights) in order to alert both sight- and hearing-impaired persons.

Signs should be provided to identify accessible routes and facilities, using the International Symbol of Access (see Appendix for sources). All signs should be located for maximum visibility along the route of travel and should have large letters with high contrast between letters and background to be legible to those with sight impairments. Raised lettering should be used to impart information to the blind. Signs are particularly important to people with hearing impairments Essential directional information and operating instructions should be clearly conveyed.

# Design Resources

Many of the suggested alterations to existing facilities were first published in *Accessibility Modifications* by Ronald L. Mace, AIA. The book is available from the Special Office for the Handicapped, North Carolina State Department of Insurance, PO Box 26387, Raleigh, North Carolina 27611, for $2.00.

Other recommended resources that provide more complete design criteria than this summary include:

- Your state's (or city's) requirements for providing access.
- *American National Standards Institute (ANSI) A117.1*, "Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped," available from American National Standards Institute, Inc., 1430 Broadway, New York, New York 11018 ($2.75). The document currently available is the 1971 version; the revised standard should be available in late 1978.
- *Barrier Free Site Design*, by the American Society of Landscape Architects Foundation. Available from US Government Printing Office, Washington, D.C. 20402 ($2.30). (Stock No. 023-000-00291-4).
- *Design Criteria: New Public Buildings Accessibility*, available from General Services Administration Business Service Center, 7th and D Streets SW, Washington, D.C. 20407, or your regional GSA office ($2.60).
- Several states have published excellent illustrated guides to design requirements for accessibility. Among them are:
  *Access for All: An Illustrated Handbook of Barrier Free Design for Ohio*, available from the Governor's Committee on Employment of the Handicapped, 4656 Heaton Road, Columbus, Ohio 43229 ($2.75).

*Illustrated Handbook of Handicapped Section of North Carolina State Building Code*, available from North Carolina Department of Insurance, Special Office for the Handicapped, PO Box 26387, Raleigh, North Carolina 27611 ($2.00).

*Removing Architectural Barriers: An Illustrated Handbook of the 1973 New Mexico Uniform Building Code*, available from Division of Vocational Rehabilitation, New Mexico Department of Education, PO Box 1830, Santa Fe, New Mexico 87503.

*Rules and Regulations of the Architectural Barriers Board, Commonwealth of Massachusetts Department of Public Safety*, available from the Architectural Barriers Board, Room 1319, 1 Ashburton Place, Boston, Massachusetts 02108 ($1.20).

# Appendix

## Information Resources

AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION AND RECREATION
Information and Research Utilization Center
Physical Education and Recreation for the Handicapped
1201 Sixteenth Street NW
Washington, D.C. 20036
(information on design of facilities for physical education and recreation for the handicapped)

AMERICAN FOUNDATION FOR THE BLIND
15 West 16th Street
New York, New York 10011
(clearinghouse of information on blindness, services and appliances)

ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD
330 C Street SW
Washington, D.C. 20201
(information on federal accessibility requirements)

COMMITTEE ON BARRIER FREE DESIGN
PRESIDENT'S COMMITTEE ON EMPLOYMENT OF THE HANDICAPPED
Washington, D.C. 20210

COUNCIL OF ORGANIZATIONS SERVING THE DEAF
PO Box 894
Columbia, Maryland 21044
(information clearinghouse on deafness)

NATIONAL CENTER FOR A BARRIER FREE ENVIRONMENT
Seventh and Florida NE
Washington, D.C. 20002
(information clearinghouse on barrier free design)

NATIONAL EASTER SEAL SOCIETY FOR CRIPPLED CHILDREN AND ADULTS
2023 West Ogden Avenue
Chicago, Illinois 60612

REHABILITATION SERVICES ADMINISTRATION
Department of Health, Education and Welfare
330 C Street SW
Washington, D.C. 20201

# Sources for International Symbol of Access

Ability Building Center, Inc.
1500 First Avenue NE
Rochester, Minnesota 55901

C.A.P.H., Inc.
PO Box 22552
Sacramento, California 98522

Jersey Cape Diagnostic, Training and Opportunity Center, Inc.
Box 31
Ocean View, New Jersey 08230

Mid Michigan Stamps and Signs, Inc.
PO Box 2277
400 North Larch Street
Lansing, Michigan 48912

Pict-O Signs
PO Box 372
Amsterdam, New York 12010

President's Committee on Employment of the Handicapped
Washington, D.C. 20210
(indoor decals only)

Screen Art
2331 Tacoma Avenue South
Tacoma, Washington 98402

Seton Name Plate Corporation
592 Boulevard
New Haven, Connecticut 06505

Tacoma Rubber Stamp
919 Market Street
Tacoma, Washington 98402

Vermont Governor's Committee on Employment of the Handicapped
81 River Street
Montpelier, Vermont 05602

This list includes all firms whose products have been brought to the attention of the authors of this publication. Other sources may be found in your locality.

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Figures 1, 5, 7, 9 and 10, courtesy of *Job Ready*, a publication of the State of Washington Division of Vocational Rehabilitation produced by the Easter Seal Society for Crippled Children and Adults of Washington Access-Abilities Unit.

Figures 2, 3, 4, 6 and 8, courtesy of *Accessibility Modifications*, a publication of the Special Office for the Handicapped, North Carolina Department of Insurance produced by Ronald L. Mace, AIA.



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